



ii) Find $f(x)$ as a polynomial in x from the given data and find $f(8)$.

x	3	7	9	10
f(x)	168	120	72	63

(OR)

b) i) Calculate $\int_2^{10} \frac{dx}{1+x}$ by dividing the interval into eight equal parts and hence find an approximate value of $\log_e \frac{11}{3}$.

ii) Compute $f'(0)$ and $f'(4)$ from the following data :

x	0	1	2	3	4
y	1	2.718	7.381	20.086	54.598

15. a) i) Solve the boundary value problem $\frac{d^2 y}{dx^2} = y$, with $y(0) = 0$, $y(1) = 1$, using finite difference method with $h = 0.2$.

ii) Using Milne's method find $y(4.4)$ given $5xy' + y^2 = 2$, $y(4) = 1$, $y(4.1) = 1.0049$, $y(4.2) = 1.0097$ and $y(4.3) = 1.0143$.

(OR)

b) Using Runge-Kutta method of fourth order, solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ with $y(0) = 1$ at $x = 0.2, 0.4$.



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Question Paper Code : 52770

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017

Fourth Semester

Mechanical Engineering

MA2266 – STATISTICS AND NUMERICAL METHODS

(Common to Automobile Engineering/Production Engineering)

(Regulations 2008)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions.

PART – A

(10×2=20 Marks)

1. Define Type I and Type II errors.
2. Define Critical Region.
3. Define completely randomized design.
4. Write any two advantages of a Latin square design.
5. Give two direct methods to solve a system of linear equations.
6. Find the inverse of $A = \begin{pmatrix} 1 & 3 \\ 2 & 7 \end{pmatrix}$ by Gauss-Jordan method.
7. State the formula to find the second order derivative using forward difference formula.
8. Form the divided difference table for the following data :

x	5	15	22
y	7	36	160
9. State Taylor's series algorithm for the first order differential equation.
10. Given $y' = x + y$, $y(0) = 1$, find $y(0.1)$ using Euler's method.



PART – B

(5×16=80 Marks)

11. a) i) In a random of 1000 people from city A, 400 are found to be consumers of rice. In a sample of 800 from city B, 400 are found to be consumers of rice. Does this data give a significant difference between the two cities as far as the proportion of rice consumers is concerned? (8)
- ii) From the following table, test the independence of skilled fathers having intelligent daughter. (8)

Father \ Daughter	Daughter	
	Intelligent Daughter	Unintelligent Daughter
Skilled Father	24	12
Unskilled Father	32	32

(OR)

- b) i) 200 digits were chosen at random from a set of tables. The frequencies of the digits were given below :

Digits	0	1	2	3	4	5	6	7	8	9
Frequency	18	19	23	21	16	25	22	20	21	15

Use χ^2 test to assess the correctness of hypothesis that the digits were distributed in equal numbers in the table, given that the values of χ^2 are 16.9, 18.3, 19.7 for 9, 10, 11 degrees of freedom at 5% level of significance. (8)

- ii) Values of a variate in two samples are given below :

Sample I	5	6	8	1	12	4	3	9	6	10
Sample II	2	3	6	8	1	10	2	8	-	-

Test the significance of the difference between the sample variances. (8)

12. a) In a Latin square experiment given below are the yields in quintals per acre on the paddy crop out for testing the effect of five fertilizers A, B, C, D, E. Analyze the data for variations. (16)

B25	A 18	E 27	D 30	C 27
A19	D 31	C 29	E 26	B 23
C 28	B 22	D 33	A 18	E 27
E 28	C 26	A 20	B 25	D 33
D 32	E 25	B 23	C 28	A 20

(OR)



- b) As head of the department of a consumer's research organization, you have the responsibility of testing and comparing the life time of four brands of electric bulbs. Suppose you test the life time of three electric bulbs each of four brands, the data is given below. Each entry representing the life time of an electric bulb, measured in hundreds of hours. (16)

A	B	C	D
20	25	24	23
19	23	20	20
21	21	22	20

13. a) i) Find a positive root of $x^3 - 5x + 3 = 0$ using Newton's method. (8)
- ii) Solve $2x + y + 4z = 12$, $8x - 3y + 2z = 20$, $4x + 11y - z = 33$ using Gauss elimination method. (8)

(OR)

- b) i) Solve the system of equation correct to three decimal places using Jacobi method :
 $x + 17y - 2z = 48$, $30x - 2y + 3z = 75$, $2x + 2y + 18z = 30$. (8)

- ii) Find the dominant eigen value of the matrix $\begin{pmatrix} 25 & 1 & 2 \\ 1 & 3 & 0 \\ 2 & 0 & -4 \end{pmatrix}$ by power

method. (8)

14. a) i) Construct Newton's forward interpolating polynomial for the following data:

x	4	6	8	10
y	1	3	8	16

Hence find the value of y when $x = 5$. (8)